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# State of Utah

## DEPARTMENT OF NATURAL RESOURCES

### Division of Oil, Gas & Mining

MICHAEL R. STYLER  
Executive Director

JOHN R. BAZA  
Division Director

### Inspection Report Minerals Regulatory Program

Reviewed:

April 18, 2011

<b>Mine Name:</b> Jumbo-Jensen Quarry	<b>Permit Number:</b> M/041/0008
<b>Operator Name:</b> United States Gypsum Company	<b>Inspection Date:</b> March 31, 2011
<b>Inspector(s):</b> Peter Brinton, Paul Baker	<b>Time:</b> 10:00am to 3:00pm
<b>Other Participants:</b> Jeremy Taylor & Bruce Allen, US Gypsum	<b>Mine Status:</b> Active

Elements of Inspection	Evaluated	Comment	Enforcement
1. Permits, Revisions, Transfer, Bonds	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2. Public Safety (shafts, adits, trash, signs, highwalls)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3. Protection of Drainages / Erosion Control	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4. Deleterious Material	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Roads (maintenance, surfacing, dust control, safety)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Reclamation	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
7. Earthwork (trenches, pits, roads, highwalls, shafts, drill holes)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
8. Soils	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Revegetation	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

**Permit fee:** Current

**Bond Renewal Date:** Adjustment in progress

**Bond Amount:** \$372,300

#### Purposes of Inspection:

- 1 - To inspect revegetated areas for which full bond release has been requested,
- 2 - To evaluate a request to amend the plan to allow a final reclaimed slope ratio of 1.5h:1v, and
- 3 - To re-inspect recontoured areas approved for seeding in fall of 2010.

#### Inspection Summary:

1 - Inspection for Full Revegetation Bond Release - US Gypsum has requested the full bond release of 53.5 acres in 17 revegetated areas (some of which were formerly released in 2000). Of these 53.5 acres, biologist Paul Baker evaluated about 19.5 acres (F1, B5, Center 4A, 6A&6B, and Bowl/Hogback/Claw/3Sisters) on March 31<sup>st</sup>.

Baseline data reported in the 1987 NOI indicate a vegetative cover of 5% on steeper hillsides and south slopes, and 10% cover in lower areas and north slopes. All of the revegetated areas inspected by Paul Baker on March 31<sup>st</sup> have cover equal to or greater than 70% of the baseline, and with the exception of area B5, all are recommended for full bond release. Documentation photos were taken. A mining-created, fractured outcrop in B5 with an overhang needed to be pulled down to a stable condition before being fully released.

A number of these areas (most of which have been growing for more than three years) have a variety of desirable species, and cover greater than 70% of baseline. The NOI suggests that diammonium phosphate may have been applied to re-placed topsoil in some places. Moderate numbers of weedy non-invasive species were observed in some locations. Unidentifiable seedlings were observed in J45 (seeded during fall 2010).

2 - Inspection for 1.5h:1v Slope Ratio Evaluation - US Gypsum submitted a proposed NOI amendment to allow final reclamation grades of 1.5h:1v. During the March 31<sup>st</sup> visit, steep pre-law and reclamation



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slopes in both Jumbo and Jensen quarries were inspected and photographed to evaluate the proposed amendment.

Much of the natural landform stands stably at grades significantly steeper than 2h:1v. Based on USGS topo maps, grades of naturally-steep Carter Peak slopes with lengths of 100 to over 200 ft ranged from 1.5h:1v to 1h:1v. Despite historical erosion associated with the area's geomorphology, there are no visual indicators of significant current erosion on, or instability of, these naturally steep slopes, including those with very little natural vegetation.

Angle-of-repose, pre-law (pre-1977) slopes of mine waste material are common. Slopes are composed of natural materials such as broken shale, clay, anhydrite and sub-grade gypsum, and have been pushed over naturally steep slopes. Particle sizes vary significantly, with significant fines and some boulders. Currently, highwalls and waste rock are recontoured and/or blasted to fill adjacent voids left by the extraction of gypsum from steep hills and ridges. Waste material is commonly pushed over and down the naturally steep slopes of the pre-mining land surface near the waste rock source. Boulders collect at the bottom of the pre-law slopes. Small arroyos adjacent to excavations are commonly filled with overburden.

No visual indications of either historic or recent slope failures, or of significant erosion on pre-law mining slopes, have been observed. Groundwater is observed in the bottom of only a few pits. A number of pre-law mining slopes have vegetation cover comparable to that of naturally bare slopes, an indicator that acceptable cover is achievable on steep slopes. Angle-of-repose, post-law reclamation slopes support vegetation comparable to (and at times exceeding) that of undisturbed slopes. Safety hazards on pre-law slopes appear comparable to those of natural slopes.

3 - Re-inspection of Recontoured and Seeded Slopes - Some reclamation slopes reseeded during the fall of 2010 and having slope angles steeper than 2h:1v were re-inspected for earthwork release, since it was unclear which slopes had previously been inspected. Based on the inspection and preceding slope discussion, 34.1 acres are recommended for partial (earthwork) release from: J45, J46, J52, J57, J58, J25-J62, and Wishbone (10 ac). J53 and portions of the Wishbone regrading were not inspected, and will need future inspection.

### **Conclusions and Recommendations:**

The areas requested for release in F1, Center 4A, 6A&6B, and the Bowl/Hogback/Claw/3Sisters areas (15.8 acres total) of revegetation are recommended for full release. The outcrop in area B5 needs to be taken down to a stable condition before reclamation of this revegetation will be released for this area (3.7 acres).

A number of steep, pre-law and reclaimed waste rock slopes (+/- 1.5h:1v) were visually inspected, together with current reclamation slopes (some at the angle-of-repose). All indications are that the inspected slopes are as stable as natural slopes, and will have minimal safety hazards beyond natural slope hazards. There is no visual indication of erosion on pre-law mining slopes beyond that of natural slopes. Angle-of-repose reclamation slopes support vegetation comparable to, or exceeding, that of natural slopes.

It is recommended that the NOI be amended to allow US Gypsum to reclaim unconsolidated slopes to an angle of 1.5h:1v (37 degrees) as long as the following regulatory requirements for the reclamation of slopes will be met: "Waste piles, spoil piles and fills shall be regraded to a stable configuration and shall be sloped to minimize safety hazards and erosion while providing for successful revegetation." (R647-4-111.6)

It is recommended that the requested acres of the following areas be partially released: J45, J46, J52, J57, J58, and J25-J62. Of the partially-inspected Wishbone area, it is recommended that 10 acres be released. J53 has not yet been inspected.

**Inspector's Signature**



PNB: pbb; eb

cc: Bruce Allen, United States Gypsum Company

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Revegetated areas of F1 are located in the center and left of the photo. Note the natural areas of both sparse and less sparse vegetation to the rear. Stitched photo.



Revegetated area on F1.



Revegetated hillside on F1.



Revegetated hillside on Center 4A (stitched photo). The shrubs grew from seed. The juniper on the left and others at this site were apparently potted plants.



A generally north-facing, steep, revegetated slope in B5.



Example of successful revegetation on a steep reclamation slope in the Bowl area.





Highwall in B5 that needs to be reduced. Note the cracks and slight overhang.



Steep pre-law slope with vegetative cover comparable to some natural steep and south-facing slopes.

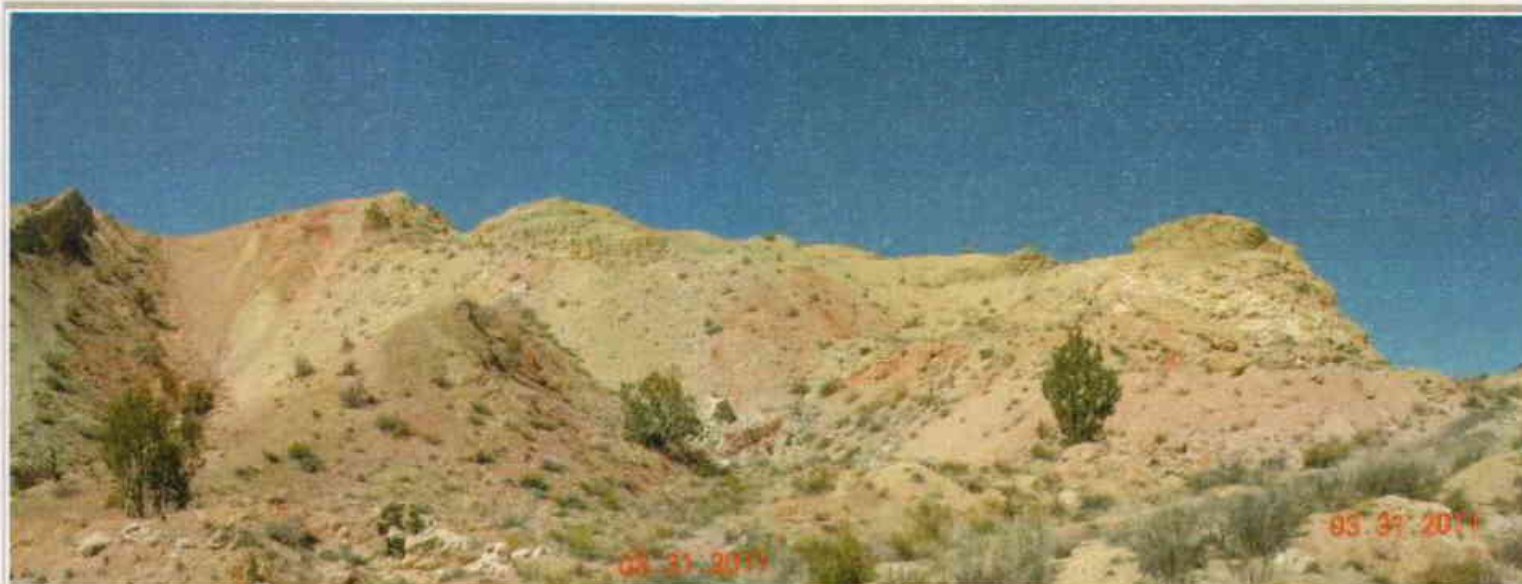


Natural slope with very little vegetation. These slopes have been (and appear to have been) eroding over a much longer period of time than mining slopes.



Pre-law steep slope near J45 with significant vegetation (photo from J45). Pre-law highwalls shown at the top of the photo. Boulders collect below.





Natural (darker) and pre-law mining (lighter) slopes with some established vegetation east of the Jumbo Quarry. No indications of waste rock slope instability were observed. Stitched photo.



Current Wishbone regrading to approximate 2h:1v slopes. These slopes were approved and are reseeded. Other Wishbone slopes were not inspected at that time. Stitched photo.



J45 recontoured slopes. Stitched photo.



J52 recontoured slopes.



J57 recontoured slopes.